

We claim:

1. The use of DNA sequences coding for a  
5 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) for producing plants with increased tocopherol, vitamin K, chlorophyll and/or carotenoid contents.
2. The use of a DNA sequence SEQ ID No. 1 or SEQ ID No. 3 or of  
10 a DNA sequence which hybridizes with the latter and codes for a 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) for producing plants with increased content of tocopherols, vitamin K, chlorophylls and/or carotenoids.
- 15 3. The use of DNA sequences coding for a 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) and coding for a p-hydroxyphenylpyruvate dioxygenase (HPPD) for producing plants with increased tocopherol, vitamin K, chlorophyll and/or carotenoid contents.  
20
4. The use of a DNA sequence SEQ ID No. 1 or SEQ ID No. 3 and of a DNA sequence SEQ ID No. 5 or of a DNA sequence which hybridizes with the latter and codes for a 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) and a  
25 p-hydroxyphenylpyruvate dioxygenase for producing plants with increased content of tocopherols, vitamin K, chlorophylls and/or carotenoids.
5. The use of DNA sequences coding for a  
30 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) and coding for a geranylgeranyl-pyrophosphate oxidoreductase (GGPPOR) for producing plants with increased tocopherol, vitamin K, chlorophyll and/or carotenoid contents.
- 35 6. The use of a DNA sequence SEQ ID No. 1 or SEQ ID No. 3 and of a DNA sequence SEQ ID No. 7 or of a DNA sequence which hybridizes with the latter and codes for a 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) and a  
40 geranylgeranyl-pyrophosphate oxidoreductase (GGPPOR) for producing plants with increased tocopherol, vitamin K, chlorophyll and/or carotenoid contents.
7. The use of DNA sequences coding for a  
45 1-deoxy-D-xylulose-5-phosphate synthase (DOXS) and coding for a hydroxyphenylpyruvate dioxygenase (HPPD) and coding for a geranylgeranyl-pyrophosphate oxidoreductase (GGPPOR) for

producing plants with increased tocopherol, vitamin K, chlorophyll and/or carotenoid contents.

8. The use of a DNA sequence SEQ ID No. 1 or SEQ ID No. 3 and of  
5 a DNA sequence SEQ ID No. 5 and of a DNA sequence SEQ ID No.  
7 or of a DNA sequence which hybridizes with the latter and  
codes for a 1-deoxy-D-xylulose-5-phosphate synthase (DOXS), a  
hydroxyphenylpyruvate dioxygenase (HPPD) and a  
geranylgeranyl-pyrophosphate oxidoreductase (GGPPOR) for  
10 producing plants with increased content of tocopherols,  
vitamin K, chlorophylls and/or carotenoids.
9. A process for producing plants with increased tocopherol,  
vitamin K, chlorophyll and/or carotenoid contents, which  
15 comprises expressing a DNA sequence SEQ ID No. 1 or SEQ ID  
No. 3 or a DNA sequence which hybridizes with the latter in  
plants.
10. A process for producing plants with increased tocopherol,  
vitamin K, chlorophyll and/or carotenoid contents, which  
20 comprises expressing a DNA sequence SEQ ID No. 1 or SEQ ID  
No. 3 and a DNA sequence SEQ ID No. 5 or DNA sequences which  
hybridize with the latter in plants.
- 25 11. A process for producing plants with increased tocopherol,  
vitamin K, chlorophyll and/or carotenoid contents, which  
comprises expressing a DNA sequence SEQ ID No. 1 or SEQ ID  
No. 3 and a DNA sequence SEQ ID No. 7 or DNA sequences which  
hybridize with the latter in plants.
- 30 12. A process for producing plants with increased tocopherol,  
vitamin K, chlorophyll and/or carotenoid contents, which  
comprises expressing DNA sequences SEQ ID No. 1 or SEQ ID No.  
3, SEQ ID No. 5 and SEQ ID No. 7 or DNA sequences which  
35 hybridize with the latter in plants.
13. A process for transforming a plant, which comprises  
introducing an expression cassette comprising a promoter and  
40 a DNA sequence SEQ ID No. 1 or SEQ ID No. 3 into a plant  
cell, into callus tissue, a whole plant or protoplasts of  
plant cells.
- 45 14. A process for transforming a plant, which comprises  
introducing an expression cassette comprising a promoter and  
DNA sequences SEQ ID No. 1 or SEQ ID No. 3 and SEQ ID No. 5

50

into a plant cell, into callus tissue, a whole plant or protoplasts of plant cells.

15. A process for transforming a plant, which comprises  
5 introducing an expression cassette comprising a promoter and DNA sequences SEQ ID No. 1 or SEQ ID No. 3 and SEQ ID No. 7 into a plant cell, into callus tissue, a whole plant or protoplasts of plant cells.
- 10 16. A process for transforming a plant, which comprises introducing an expression cassette comprising a promoter and DNA sequences SEQ ID No. 1 or SEQ ID No. 3, SEQ ID No. 5 and SEQ ID No. 7 into a plant cell, into callus tissue, a whole plant or protoplasts of plant cells.
- 15 17. A process for transforming plants as claimed in claim 13-16, wherein the transformation takes place with the aid of the strain *Agrobacterium tumefaciens*, of electroporation or of the particle bombardment method.
- 20 18. A plant transformed with an expression cassette as set forth in claim 13-16.
- 25 19. A plant as claimed in claim 18 selected from the group of soybean, canola, barley, oats, wheat, oilseed rape, corn or sunflower.
20. The use of SEQ ID No. 1 or SEQ-ID No. 3 for producing a test system for identifying DOXS inhibitors
- 30 21. A test system based on the expression of an expression cassette as set forth in claim 13 for identifying DOXS inhibitors.
- 35 22. The use of a plant comprising a DNA sequence SEQ ID No. 1 or SEQ ID No. 3 or a DNA sequence which hybridize with the latter for producing plant and bacterial DOXS.

40

45

DNA sequence coding for a 1-deoxy-D-xylulose-5-phosphate synthase gene and overproduction thereof in plants

5 Abstract

A process for producing plants with increased vitamin E biosynthetic activity by overexpression of a plant

10 1-deoxy-D-xylulose-5-phosphate synthase gene from *Arabidopsis* or *E. coli*.

15

20

25

30

35

40

45